

**If** the road to hell is paved with good intentions, then it's fair to say that the road to well-intentioned infrastructure improvements is paved with hell. At least that's the sense from the people who have to make these systems work together.

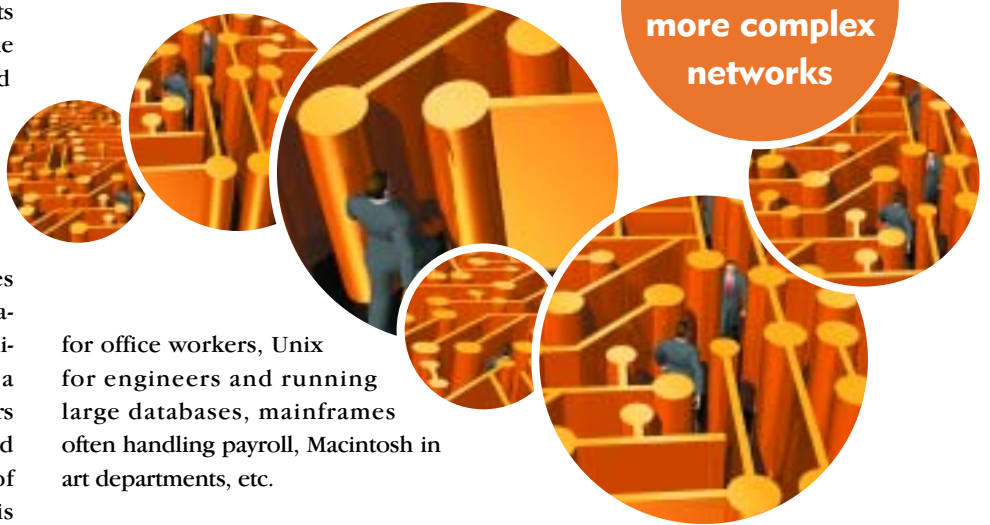
Not that most infrastructure experts today would have it any other way. The advances in flexibility, performance and intelligence analysis far outweigh the pain in making the move, but the experts do stress that it takes care.

Arthur Gruen is a partner with Wilkofsky Gruen Associates, a telecommunications consulting firm that does the annual market review and IT infrastructure forecast for the Telecommunications Industry Association (TIA), a trade association representing providers of communications and IT products and services. He says the top positive of today's complicated infrastructure is that there is "more of an opportunity to customize. It's still difficult to do, but before it was almost impossible."

For years, systems were dominated with the early legacy form of proprietary systems. In the 90s, multiple operating systems became the enterprise norm, but they were proprietary outside of their niche. That wasn't initially much of a problem because companies tended to segregate those operating systems by work area, with Windows office suites

# An Infrastructure Imperative

The art of managing more complex networks



for office workers, Unix for engineers and running large databases, mainframes often handling payroll, Macintosh in art departments, etc.

## Interoperable Infrastructure

But today's infrastructure is becoming truly interoperable for operating systems, which is where things get more complicated. Networks are changing, moving away from the private networks that dominated much of the 20th century to data and telecommunications networks riding over the public Internet.

"There are a lot of proprietary systems that didn't interoperate with each other. Back then, you simply didn't

have that many alternatives. You could really customize and get the applications and features you want," Gruen says. "You can now do all kinds of different things. You can do more in terms of creating your local networks and integrating phone systems and putting them all on one network. But it's become hellishly complicated."

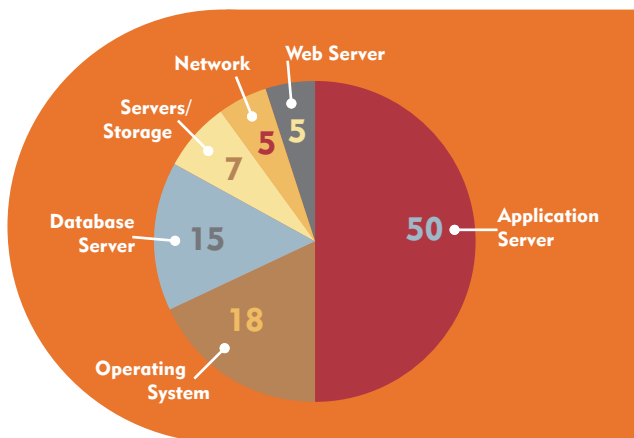
Indeed, as enterprise infrastructure becomes more complex—and more flexible—strict adherence to global standards becomes more essential. That rigid adherence to standards, however, comes at a steep price: new restrictions on customization.

This is not to suggest that customization will go away. But companies that have gotten used to years of staff programmers tweaking applications and having systems talk with homegrown applications written in-house are going to find a bumpy road ahead.

### Where Do Network Problems Usually Hide?

As networks get more complicated, service disruptions can come from an increasing number of places.

(% of reported problems)



Source: Integrien Corp.

“Businesses will always require customization no matter what anybody says,” says Roman Pacewicz, an AT&T vice president for enterprise networking. “There are certainly situations where (customization) is totally justified and users are willing to pay the price for that. Certainly, if you do not follow or adhere to industry standards, it is quite commonplace for costs and complexity to soar.”

It’s not merely hardware, software and networking standards that are crucial to watch, Pacewicz says, but global and Internet standards, too. “The ability to take full advantage of emerging market revenue and cost opportunities globally is crucial, especially as IP capabilities start to soar over the next year or so. As a practical matter, a proprietary environment simply won’t allow you to do that.”

Mike Yates is the director of service development at Insight Direct USA, a division of Tempe, Ariz.-based Insight Enterprises Inc., a \$3 billion systems integrator. He says customization is absolutely one of the major causes for the infrastructure difficulties companies are enduring today. But he also said much of the pain is self-inflicted.

Referring to the IT community in general, he says, “We did it to ourselves. We have CIOs who say, ‘The way we do it

### Infrastructure Resources

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SunGard Corp.	<a href="http://www.sungard.com">http://www.sungard.com</a>
Telecommunications Industry Association (TIA)	<a href="http://www.tiaonline.org">http://www.tiaonline.org</a>



here at Company X is the best way it’s ever been done, even if it’s dysfunctional.’ That’s the way corporations have been buying IT for 30 years.”

Yates points to major customization projects as the single biggest problem. “There’s been a lot of short-sightedness all around. People buy and sell the needs of the moment and don’t think about the future. That’s why we had Y2K,” he says, quoting a typical CIO saying, “‘Because of requirements that need to get filled immediately, my environment has grown into this monster that I cannot manage.’”

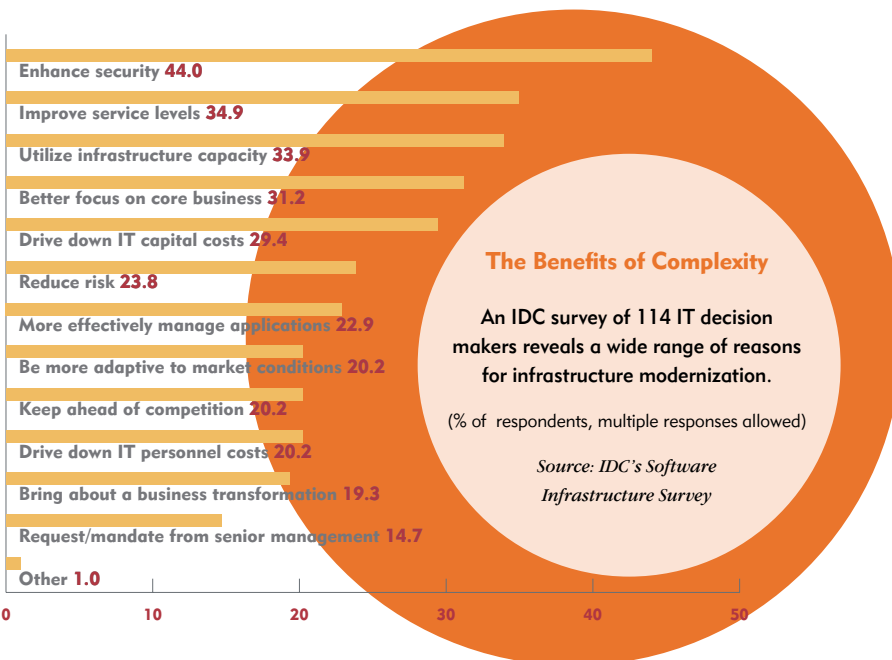
One approach to minimizing future infrastructure pain is to closely watch both networking trends and an IT department’s likely future capability needs. “You need to understand what kind of connectivity options are coming around. Don’t design yourself into a corner,” Yates says.

He also agrees that strict adherence to standards is more crucial than ever. “People buy these large applications and customize them and then things change and they have to reengineer everything,” Yates says. “There are some well-established standards. You deviate away from them at your own peril. Stop taking technology that was well-designed to function in a certain way and then customizing it to do something else. The industry can’t support a constant series of one-offs.”

Vendors have always dominated technology standards bodies, with a few end users periodically participating. Damon Wei, an AT&T group manager, says he would encourage end-user company executives to start playing a much more active role with the standards bodies, which means they must donate some of their talented technical people to attend a lot of faraway meetings.

“Not only do you need to adhere to standards, but you need to participate in the creation of standards,” Wei says.

Indeed, he adds, it’s possible that some end-user companies could use the



standards process to sneak in some customization. If one company wanted to have inventory updates handled in a very specific way, for example, instead of customizing that approach, it might be able to convince a standards committee that its approach is better. If the company is persuasive enough, that standards committee participation could deliver its customization as part of an accepted industry-wide standard.

"If you participate in the creation of those standards, you can perhaps influence the development of those standards," Wei says.

### Rapidly Diversifying Audiences

Rapidly diversifying audiences are also impacting infrastructure complexity today, with intranets and extranets continuing to grow quickly and steadily. The recent surge in popularity of the virtual private network (VPN) and the corresponding tidal wave of security threats is forcing greater encryption.

But those expanding networks are adding flexibility and saving dollars, positioning companies to cut costs as well as take advantage of upcoming technologies. That's important, as the numbers of intranet users (including remote sites, corporate telecommuters and the traveling employee) and extranet users (suppliers, distributors and large customers) continue to grow.

Global operations are becoming more typical, too, even for companies that would not be considered traditional multinational operations. Those newcomers to the global stage include U.S.-only retailers who are finding their Web presence attracting overseas prospects, American firms selling only to American consumers but who are discovering lower cost Asian suppliers, and U.S. operations outsourcing helpdesk and programming functions to India.

"As that occurs, it just takes the current problems you have and extends them geographically," Wilkofsky Gruen Associates' Gruen says. "You simply have to do

more integrating than you did before."

That also forces even more standardization on a company, which is tricky because the world markets are far from standardized. "Europe does stuff their way," he says, referencing the popularity of the CDMA wireless approach in the United States while Europe prefers GSM, and "you have a lot of different things going on in Asia," with China and South Korea using their own proprietary wireless approaches.

It's not necessarily bad, though. "Because of those networks and new undersea cables, you have a huge capacity now and you can transmit things back and forth pretty quickly. You can even have back-office operations in another country," Gruen says. "You can move re-

wireless has the most potential to rewrite the way corporate technology is deployed and used.

Raghu Rau, a Motorola senior vice president, predicts that the cost of wireless communications will drop by a factor of three and that data speeds will increase.

The reliability may be initially weaker, though, not so much because of technology issues but because of cost issues. "Physically, it may be possible to have the same level of reliability as wireline," Rau says. "But the business case will make it too expensive to provide the same level of coverage."

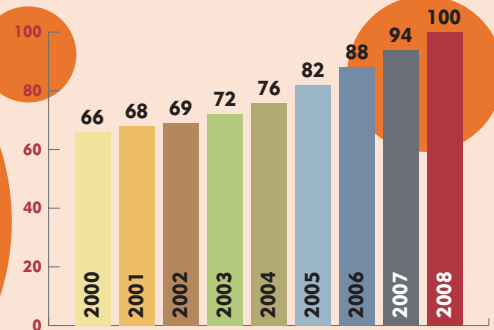
But Rau says he expects reliability to increase as a result of the use of hybrid phones and Wi-Fi devices, because both will be designed to automatically shift

### Datacom Infrastructure Needs Soaring

Just about every piece of today's infrastructure is going to feel the weight of expanded data communications and internetworking equipment deployments.

(\$ billions)

Source: TIA and Wilkofsky Gruen Associates



Types of equipment include LAN cards, servers, PC LAN OS, hubs, wiring, routers, SNA gateways, Gigabit Ethernet switches, systems management, modems, remote access devices, Web servers, CSU/DSUs and multiplexers.

sources around and have more choices, but it's also much more complicated."

This makes things especially difficult for the IT executive who is expected to project investments out a couple of years.

### Wireless Acceptance

One of the reasons these infrastructure choices are likely to get much more complicated is the growing world of wireless acceptance. From wireless LANs bypassing construction needs as well as adding flexibility to high-powered phone-hybrid PDAs for mobile workers to warehouse radio frequency identification (RFID) applications to retail contactless payments,

between protocols, formats and other standards. If one network gets weak, the device will shift to another network. "There will be a quantum jump in the reliability of wireless networks," he says.

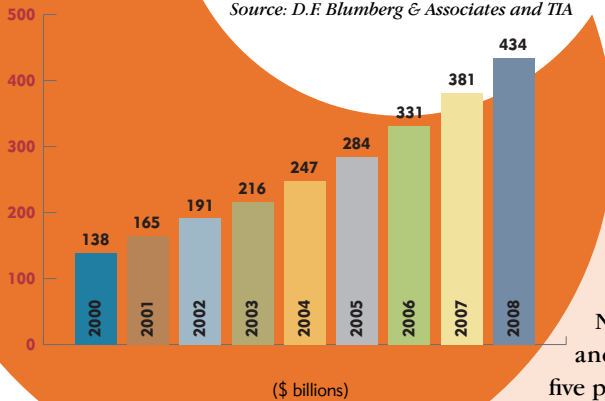
Whether wireless networks will ultimately prove easier to manage and secure is an open question. But whether to have wireless networks is now considered a corporate fait accompli.

Management of wireless LANs is "fairly straightforward" for most companies, including the monitoring of access point utilization and throughput, says Tom Hayes, a product marketing director at Computer Associates. "WLAN monitoring is now typically part of the

### The Cost of Supporting Tomorrow's Infrastructure

The infrastructure itself may seem expensive, but the services needed to support enterprise customer premises and network systems equipment can put a dent in an IT pocketbook, too.

Source: D.F. Blumberg & Associates and TIA



conversation we have with customers about infrastructure management,” he says. “Several years ago, WLAN was not part of the conversation.”

But wireless is still going to be difficult for most IT executives to resist. “Wireless is a requirement today. It is no longer ‘a nice to have,’” says Matthew J. Flanigan, president of TIA. “It makes individuals more efficient and makes a company more competitive.”

Not only is the wireless world reaching broadband speeds, but more of the wired world is, too. Flanigan argues that imminent faster wireless speeds will make management of a wireless network’s data potentially easier than its wired counterpart. “Once more fiber is deployed, then we’ll see higher speeds,” he says. “Once we’re in a truly broadband world, that will change how everyone does everything.”

### Multiple Points of Failure

The core of the problem is that today’s typical IT infrastructure has many points of failure. Of the major components that make up the IT infrastructure, “the

applications and databases account for 65 percent of the problems,” says Mazda Marvasti, co-founder and chief technology officer of Integrien, a system management tool provider in Irvine, Calif. The next most likely source of infrastructure failure lies with the operating system, which comes in at 18 percent.

The hardware, it turns out, is the least troublesome, even though that is where many companies focus their infrastructure reliability efforts.

Network components, servers and storage only account for five percent and seven percent of the problems, respectively, according to Integrien.

Another infrastructure challenge is that companies need to prepare for rapid growth. Sheer scalability and complexity can create problems. For example, many applications no longer sit on one centrally-controlled server, says Ori Inbar, vice president for SAP Netweaver product marketing.

Adds Bill Wohl, SAP’s vice president for global communications: “In today’s economic environment, rip-and-replace projects won’t sell to boards of directors. Quick returns and projects that leverage existing skills and investments are the IT projects that will be funded.”

The challenge of creating a reliable and scalable IT infrastructure goes beyond focusing on any one—or even several—components of the infrastructure. Maintaining a reliable infrastructure entails seven disciplines, says Kenneth Smith, executive vice president of strategy and software at SunGard Availability Services. The company divides those seven disciplines into two groups, disciplines that deal with the physical infrastructure and those that deal with the management of the infrastructure.

There are four physical infrastructure

disciplines: technology, physical facility, the network and people. The technology discipline focuses on the hardware and software. The physical facility discipline addresses the computer room, environmental concerns (HVAC) and power. The network discipline involves the movement of data around the enterprise and beyond. With human error as a common cause of infrastructure failure, “we see people as a physical resource that must be managed,” Smith says.

SunGard identifies the three management disciplines as operations, information and applications. The operations discipline addresses such issues as maintenance and patch management. The information discipline deals with issues like security and backup and recovery processes. The applications discipline focuses on the management of the applications themselves.

### Investment Pays for Itself

To the extent that today’s infrastructure struggles are self-inflicted from years of ignoring standards and shortsighted customization, it’s also true that today’s executives can reverse that trend. With the lure of seamless global networks, lightning-fast wireless and applications that can scale without breaking, some companies might even recover from their infrastructure headaches just long enough to recoup their investments and focus on business objectives. The infrastructure challenge might still be a headache, but at least it’s one that companies are supposed to have. ●

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